

**CLAIMS****What Is Claimed Is:**

1. An apparatus, comprising:  
a radiation source for providing a radiation signal into a process chemical;  
5 a refraction index sensor for detecting a refraction index resulting from said radiation signal; and  
a controller to determine whether a chemical state of said process chemical is within a predetermined tolerance level in an online manner, in response to said refraction index.  
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2. The apparatus of claim 1, wherein said process chemical is in the form of a slurry.
3. The apparatus of claim 1, wherein said radiation signal is capable of being  
15 modified as a function of a chemical state of said process chemical.
4. The apparatus of claim 3, wherein said radiation signal has a wavelength in the range of approximately 800 nanometers to approximately 10,000 nanometers.
- 20 5. The apparatus of claim 3, wherein said controller is capable of determining a concentration of a chemical in said process chemical based upon said refraction index.
6. The apparatus of claim 1, wherein said controller is adapted to compare said refractive index to a predetermined tolerance level stored in a library to determine whether  
25 said chemical state of said process chemical is within a predetermined tolerance level.
7. The apparatus of claim 1, further comprising a temperature sensor, said temperature sensor to determine a temperature of said process chemical.

8. The apparatus of claim 7, wherein said controller is adapted to correlate a chemical state of said process chemical with at least one of said temperature of said process chemical and a flow rate of said process chemical.

5 9. The apparatus of claim 1, further comprising a chemical transport conduit for transporting said process chemical to a processing tool.

10 10. The apparatus of claim 9, further comprising a slip stream for sampling said process chemical, said slip stream being coupled with a portion of said chemical transport conduit.

11. The apparatus of claim 10, wherein said slip stream comprises a first pressure regulator to regulate a pressure to provide said process chemical flow into said slip stream.

15 12. The apparatus of claim 11, wherein said slip stream comprises a first valve regulator to control the flow of said process chemical into said slip stream.

20 13. The apparatus of claim 10, wherein said slip stream comprises a second pressure regulator to regulate a pressure to provide a flow of cleansing agent into said slip stream.

14. The apparatus of claim 13, wherein said slip stream comprises a first valve regulator to control the flow of said cleansing agent into said slip stream.

25 15. The apparatus of claim 10, wherein said slip stream comprises a third valve for directing a flow of at least one of said process chemical and said cleansing agent into said refractive index sensor.

30 16. The apparatus of claim 1, wherein said refraction index sensor comprises a flow cell for directing a flow of said process chemical into said refraction index sensor.

17. The apparatus of claim 1, wherein said refraction index sensor comprises a charge coupled device (CCD) for detecting said refraction index.

18. The apparatus of claim 1, wherein said refraction index sensor comprises a plasmon surface unit detecting said refraction index, said plasmon surface unit comprising a metal portion, a dielectric portion, and a metal-dielectric interface for detecting a surface plasmon.

19. A system, comprising:

a process chemical unit to provide a process chemical for processing a semiconductor wafer;

a processing tool to perform a process upon a semiconductor wafer using said process chemical;

a process chemical transport conduit to transport said process chemical from said process chemical unit to said processing tool; and

a chemical analysis unit to perform an online analysis of said process chemical in said process chemical transport conduit, said chemical analysis unit comprising a refraction index sensor for detecting a refraction index resulting from a radiation signal and a controller to determine whether a chemical state of said process chemical is within a predetermined tolerance level in an online manner, in response to said refraction index.

20. The system of claim 19, wherein said processing tool is adapted to perform a chemical-mechanical planarization process upon said semiconductor wafer.

21. The system of claim 19, wherein said process chemical is in the form of a slurry.

22. The system of claim 19, wherein said radiation signal has a wavelength in the range of approximately 800 nanometers to approximately 10,000 nanometers.

23. The system of claim 22, wherein said controller is capable of determining a concentration of a chemical in said process chemical based upon said refraction index.

24. The system of claim 19, wherein said controller is adapted to compare said refractive index to a predetermined tolerance level stored in a library to determine whether said chemical state of said process chemical is within a predetermined tolerance level.

25. The system of claim 19, further comprising a temperature sensor, said temperature sensor to determine a temperature of said process chemical.

26. The system of claim 25, wherein said controller is adapted to correlate a chemical state of said process chemical with at least one of said temperature of said process chemical and a flow rate of said process chemical.

27. The system of claim 19, further comprising a slip stream for sampling said process chemical, said slip stream being coupled with a portion of said chemical transport conduit.

28. The system of claim 27, wherein said slip stream comprises a first pressure regulator to regulate a pressure to provide said process chemical flow into said slip stream.

29. The system of claim 28, wherein said slip stream comprises a first valve regulator to control the flow of said process chemical into said slip stream.

30. The system of claim 27, wherein said slip stream comprises a second pressure regulator to regulate a pressure to provide a flow of cleansing agent into said slip stream.

31. The system of claim 30, wherein said slip stream comprises a first valve regulator to control the flow of said cleansing agent flow into said slip stream.

32. The apparatus of claim 27, wherein said slip stream comprises a third valve for directing a flow of at least one of said process chemical and said cleansing agent into said refractive index sensor.

5 33. The system of claim 19, wherein said refraction index sensor comprises a flow cell for directing a flow of said process chemical into said refraction index sensor.

34. The system of claim 19, wherein said refraction index sensor comprises a charge coupled device (CCD) for detecting said refraction index.

10 35. The system of claim 19, wherein said refraction index sensor comprises a plasmon surface unit detecting said refraction index, said plasmon surface unit comprising a metal portion, a dielectric portion, and a metal-dielectric interface for detecting a surface plasmon.

15 36. A method, comprising:  
receiving a request to provide a process chemical to a processing tool;  
transporting said process chemical through a chemical transport unit to said  
20 processing tool based upon said request; and  
performing an online monitoring of a chemical state of said process chemical, said  
online monitoring comprising analyzing a refractive index signal caused by  
the presence of a radiation signal sent through said process chemical to  
determine whether said chemical state of said process chemical is within a  
25 predetermined level of tolerance.

37. The method of claim 36, wherein performing said online monitoring of said chemical state of said process chemical further comprises determining a concentration of a chemical in said process chemical based upon said refractive index signal.

38. The method of claim 37, wherein determining a concentration of a chemical in said process chemical based upon said refractive index signal further comprises determining a concentration of hydrogen peroxide in said process chemical based upon said refractive index signal.

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39. The method of claim 37, wherein determining a concentration of a chemical in said process chemical based upon said refractive index signal further comprises determining a concentration of glycol ether in said process chemical based upon said refractive index signal.

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40. The method of claim 36, wherein performing an online monitoring of said chemical state of said process chemical further comprises determining a temperature of said process chemical.

41. A computer readable program storage device encoded with instructions that, when executed by a computer, performs a method, comprising:  
receiving a request to provide a process chemical to a processing tool;  
transporting said process chemical through a chemical transport unit to said processing tool based upon said request; and  
performing an online monitoring of a chemical state of said process chemical, said  
online monitoring comprising analyzing a refractive index signal caused by  
the presence of a radiation signal sent through said process chemical to  
determine whether said chemical state of said process chemical is within a  
predetermined level of tolerance.

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42. The computer readable program storage device encoded with instructions that, when executed by a computer, performs the method of claim 41, wherein performing said online monitoring of said chemical state of said process chemical further comprises determining a concentration of a chemical in said process chemical based upon said refractive index signal.

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43. The computer readable program storage device encoded with instructions that, when executed by a computer, performs the method of claim 41, wherein performing an online monitoring of said chemical state of said process chemical further comprises determining a temperature of said process chemical.

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44. The computer readable program storage device encoded with instructions that, when executed by a computer, performs the method of claim 43, wherein performing an online monitoring of said chemical state of said process chemical further comprises calibrating said refractive index signal based upon said temperature of said process chemical.

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